



Faculty of Engineering and Architecture
Computer Engineering Department

COM 501 – Analysis and Design of Algorithms HOMEWORK #2

Academic Year: Spring 2014-15

Due Date: 22.05.2015

Instructor: Assoc. Prof. Dr. Hürevren KILIÇ

A bus travels in the Grid-City. The travel starts at the northwestern-most (i.e. *the source*) and ends at the southeastern-most location (i.e. *the destination*) of the city, see figure below. There are students on the bus-stops waiting for the bus to reach their university. However, because of some mechanical problems our bus can only move either to the south direction or to the east direction, during its travel. The aim of the travel is to pick up as many students as possible and transport them to the destination. In the figure, the numbers on the edges show the number of students waiting for the bus and they are assumed to be fixed in time. A path shown by black arrows is an example path providing 36 students to reach their university. Note that the path given in the figure is **NOT** an optimal path but a path just being an example.

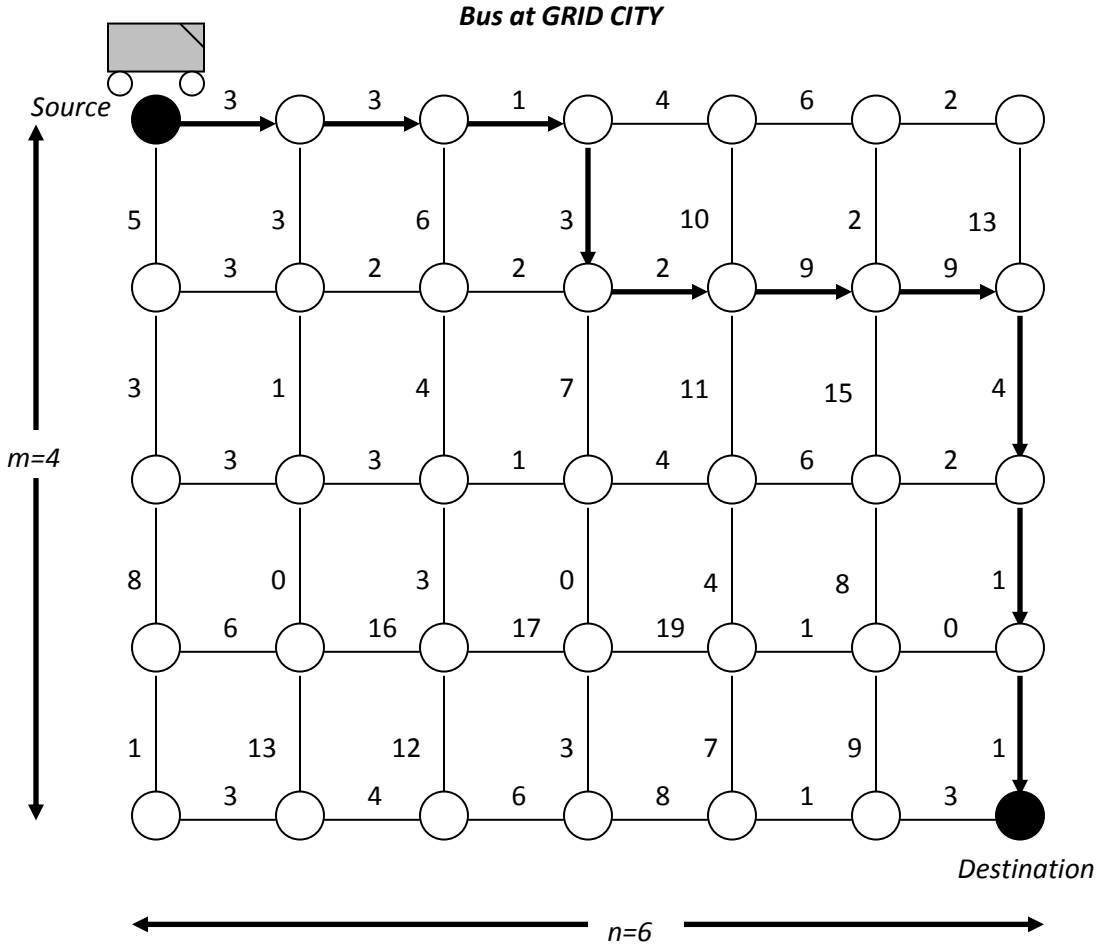
1. Devise an algorithm solving the above problem on paper. Write down each step of your solution and explain. **(50 pts.)**
2. Implement your algorithm in C++ or Java language. **(40 pts.)**
3. Analyze its complexity of your algorithm. **(10 pts.)**

Sample input file:

```
4 6
3 3 1 4 6 2 3 2 2 2 9 9 3 3 1 4 6 2 6 16 17 19 1 0 3 4 6 8 1 3 5 3 8 1 3 1 0 13 6 4 3 12 3 7 0 3 10 11
4 7 2 15 8 9 13 4 1 1
```

Sample output file:

```
(1,1) (1,2) (1,3) (1,4) (2,4) (3,4) (3,5) ... ..
```



Note:

- Inputs of the algorithm should be :
 - m and n (i.e. dimensions of the grid)
 - Sequence of edge values defining the number of students waiting on each bus-stop of the Grid-City. You are **free** in your input sequence indexing and representation.

Output of the algorithm should be :

 - A **vertex sequence** like $v_{11}, v_{12}, v_{22} \dots$ defining an optimal path. You are **free** in your output sequence indexing and representation.
- In this homework, you are **required** to work **alone**.
- Submit one .doc file for your report & comments and also source-code files for your program implementations, to e-mail address hurevren.kilic@gediz.edu.tr.
- Late submissions** will be graded by using formula $100-10*d^2$ where d is the number of **late submission days**.

5. Besides from submitting the homework, you are also required to make demonstration of your code, comments and discussions.
6. Submissions without demonstrations **will NOT be graded**.
7. **Time table** for the demos will be announced **later**.